

TITLE: ON THE OCCURRENCE AND ANALYSIS OF NITROCATECHOL(S) IN CIGARETTE SMOKE

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ABSTRACT: The pyrosynthesis of catechol, the most abundant phenolic smoke constituent, can be inhibited by the presence of increasing amounts of nitrate in tobacco. Thus, selection of laminae and addition of nitrate to tobacco are means of effecting significant decreases of the phenolic compounds in smoke while they increase formation of nitroalkanes and nitrobenzenes. Mechanistic considerations and earlier studies by Kallianos et al (1968) imply that catechol levels in smoke may be partially lower because of formation of nitrocatechol(s). Using the methodology employed in the earlier study, we found 4-nitrocatechol (4-NC) in microgram amounts in the smoke condensate of a cigarette. To rule out artifactual formation of 4-NC, we used the rotating head of a Borgwaldt Hamburg II Smoker with nitrogen inlet for every second puff. Smoke particulates were trapped on a Cambridge filter (10 cigs. per pad). Pads were extracted with boric acid and extracts were acidified with 1N HCl prior to ether extraction. Concentrates of the dried organic extract were silylated and analyzed by capillary GC. With a detection limit of 100 ng/cigarette we were unable to measure significant quantities of 4-NC. Therefore, other possible routes of reduction of catechol(s) in smoke of nitrate-rich tobacco are being investigated.

REVIEW: This talk was predominately a report on the effect of varying nitrate levels on different smoke ingredients. Two methods were used to collect the condensate. Method 1 used a cold trap and method 2 used a Cambridge pad. Analysis of catechol or 4-nitrocatechol involved extraction of the pad; obtaining an enriched fraction; derivatizing with BSTAFA; and gas chromatography (GC) on an OV-101 fused silica column. It was concluded that 4-nitrocatechol was probably an artifact in condensate since it could not be found using method 2. The remainder of the talk focused on the effects of varying nitrate levels (62-mm tobacco rod with 4.3 mg to 25.7 mg nitrate added). For example, FTC tar, CO, CO₂, B(a)P, catechol, and biological activity decreased with increasing nitrate levels; and nitrogen oxide, NNN, NAT, NAB, NDMA and NNK increased with increasing nitrate level.

-Reviewed by R. Izac

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